SAWATEC

INSTRUMENTS

Hotplate HP-200

The SAWATEC HP-200 hotplate has been developed for standard soft bake and hard bake processes in lithography and similar applications. The temperature range is designed as standard up to 250° C. The HP-200 offers high uniformity and process repeatability and can be used for substrates up to 200mm.

Outstanding features of the hotplate are its robust design and ease of operation. The hotplate's modular design means that it can be used in a wide range of applications with high optional expandability (wet bench integration).

FEATURES:

- ⇨ Digital temperature controller with actual-and nominal value
- ⇨ Max. substrate size 200mm
- ⇨ Substrate loading: manual
- ⇨ Substrat fixation via vacuum
- ⇨ Accuracy of temperature: +/-1°C per 100°C
- ⇨ Pneumatic lift of the lid
- ⇨ Internal height max. 23mm max. substrat thickness 18mm
- ⇨ Heating ramp up possible with 20 program-steps

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For further information please contact our sales-department: sales@sawatec.com

Pictures may show standards with options.

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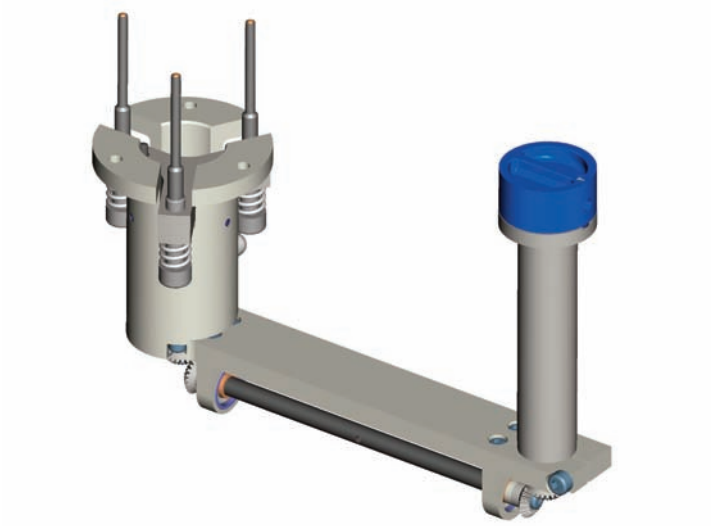
Swiss

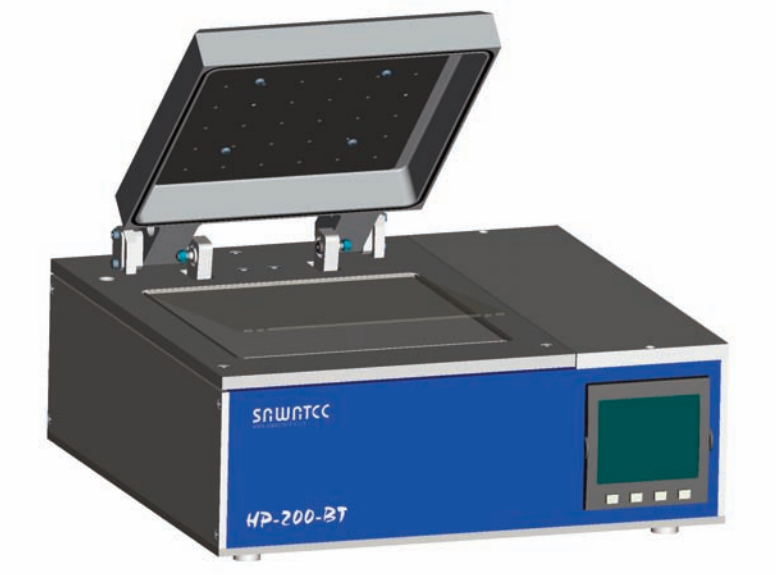
OPTIONS

- Nitrogen flush controlled
  - N2-lid made of anodised aluminium
  - N2 solenoid valve
- Proximity as well as loading pins
  - Pneumatic driven pins (stroke 8mm)
  - Manual adjustable proximity pins between 0-1mm (0.1mm increments)
  - Pin made of Inconell with Ceramicball
  - Pin-circel-diameter Ø 45mm
- Protection glass without pins
- Protection glass with proximity pins

PROXIMITY PINS



PROTECTION GLASS



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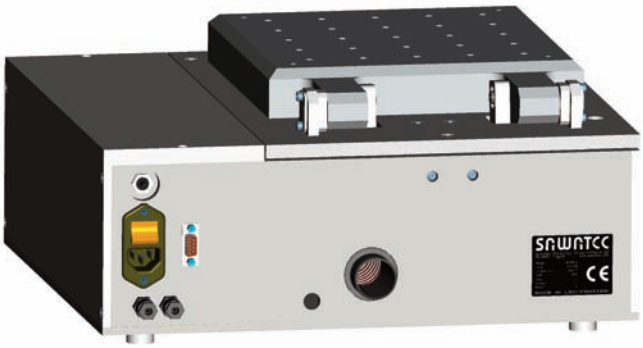
PERFORMANCE

- Temperature range: 25 - 250°C
- Accuracy of temperature: +/-1°C per 100°C
- Substrate loading: manual
- Substrat fixation via vacuum manual controlled
- Max. substrate size 200mm
- Internal height max. 23mm max. substrate thickness 18mm

REQUIRED MEDIA

- 240 VAC 50/60Hz (1200 W)
- Technical vacuum, tube Ø6/4mm
- Exhaust connector Ø32mm
- Compressed air 4 bar, tube Ø6/4mm



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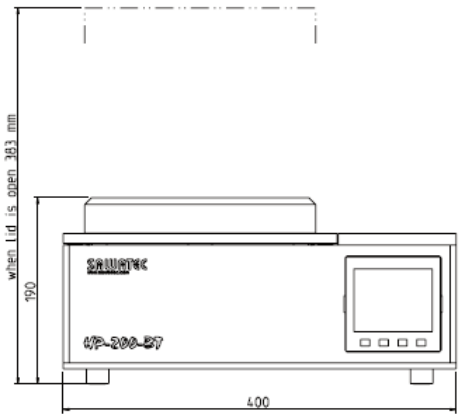
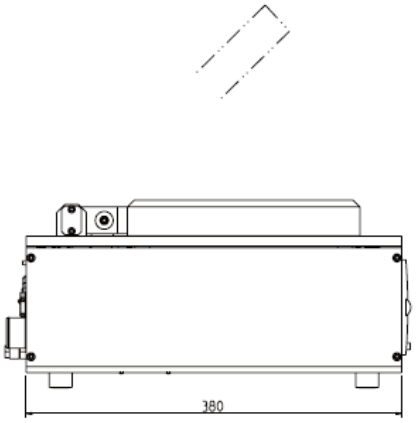
HP-200

VIEWS

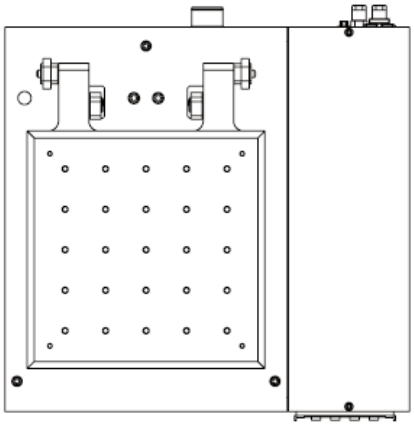
front view



side view



top view



DIMENSIONS

⇨	Size:	400x380x190mm (LxBxH)
⇨	Hotplate size:	210x210mm
⇨	Weight:	approx. 20kg

DESIGN

⇨	Housing:	Anodised aluminium
⇨	Hotplate material:	Anodised aluminium

DEALER

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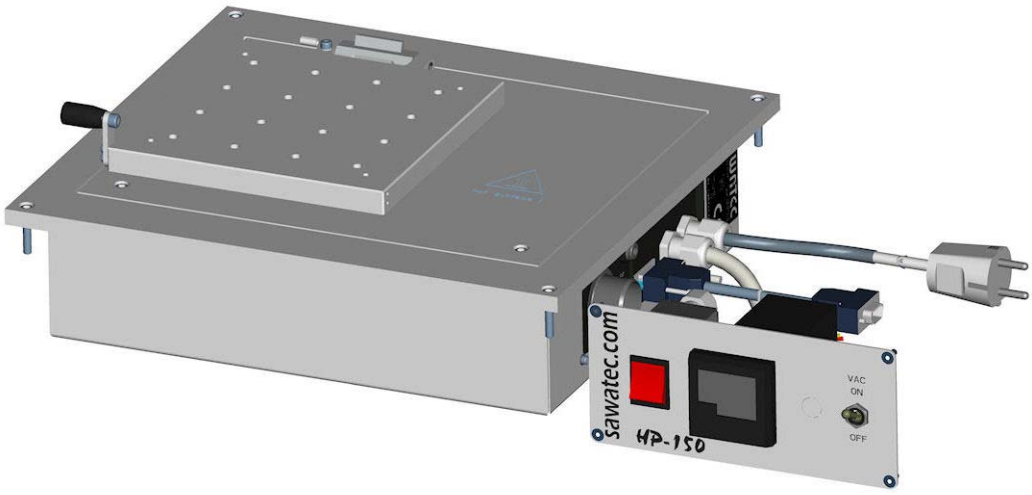
User Manual

SAWATEC

Hotplate 150-250 BM



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MA-HP-150-250-BM en

Title	Hotplate 150-250 BM - User Manual
Manual	MA-HP-150-250-BM en
Revision	March 2013
History	v1.0: First issue of manual (2013-03)
Date of print	2013-03-06
Products	Hotplate 150-250 BM

Audience This description of the Hotplate 150-250 BM is primarily intended for system integrators.

Manufacturer (OEM)
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Customer service information Write down the contact details (phone, fax, etc.) for your System integrator or local distributor.

Contents

Related documents

- Hot plate HP-150-250 BT (bench top version).
- Electric diagrams for the device.
- Maintenance guideline
- List of spare parts and wear parts.

Product description

The Hotplate 150-250 BM is designed for temperature processes in the semiconductor industry. This includes lacquering and baking of silicon wafers.

Main features

- Substrate loading hight up to 5 mm
- Substrate size up to 150 x 150 mm
- Digital setting and display of top plate temperature
- Wide temperature range 25 °C to 150 °C or 250 °C

Main parts

The figure below shows the main parts of the Hotplate 150-250 BM

1 Frame to be mounted into housing.

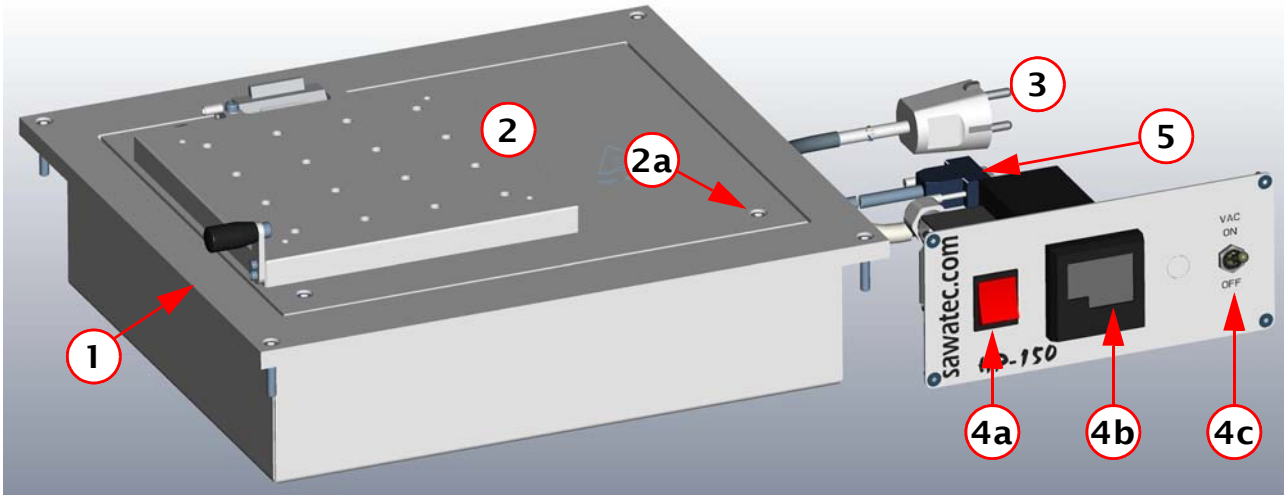
2 Hotplate with levelling screws (**2a**).

3 Mains connection.

4 Control panel with main switch (**4a**), temperature controller (**4b**) and vacuum switch (**4c**).

5 Connection between plate unit and controller.

6 Connection between plate unit and main switch (**4a**)



Connectors

The connections one the rear are labelled.

Technical data

Operational characteristics

Property	Nominal value	Tolerance / specification
Hotplate	164 x 164 mm	Aluminium alloy anodised
Temperature range	25 °C to 150 °C Optionally to 250 °C	0.1 °C display resolution
Temperature accuracy	± 1 °C	per 100 °C
Substrates size	150 x 150 mm	
Substrate fixation	vacuum	centre of the plate, manual switch

Physical properties and environment

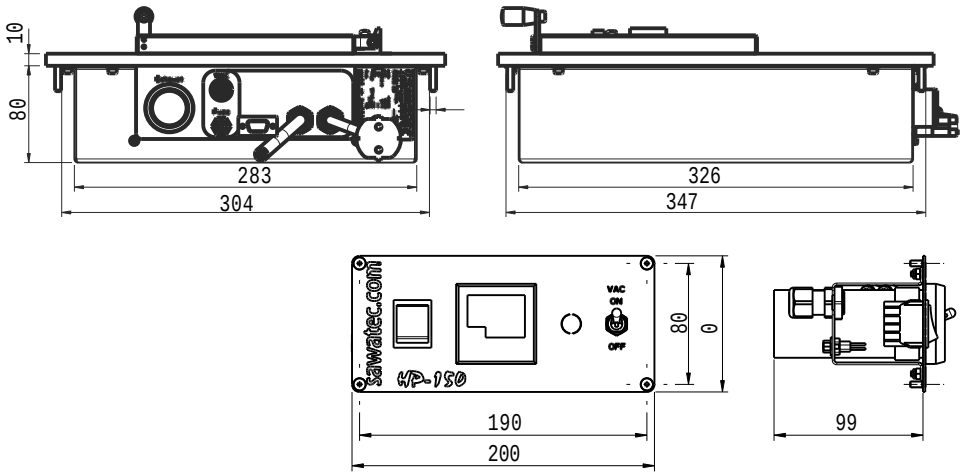
Property	Nominal value	Specification
Length / width / height	36 / 33 / 13 cm	See details below
Weight	7 kg	
Electrical power	240 VAC, 350 W	LNPE cable without plug
Vacuum	technical vacuum (controllable)	Fitting for hose Ø 6/4 mm

☞ The Hotplate 150-250 BM must be set up on a clean, plain, levelled surface in proper distance to any flammable material.

Standards

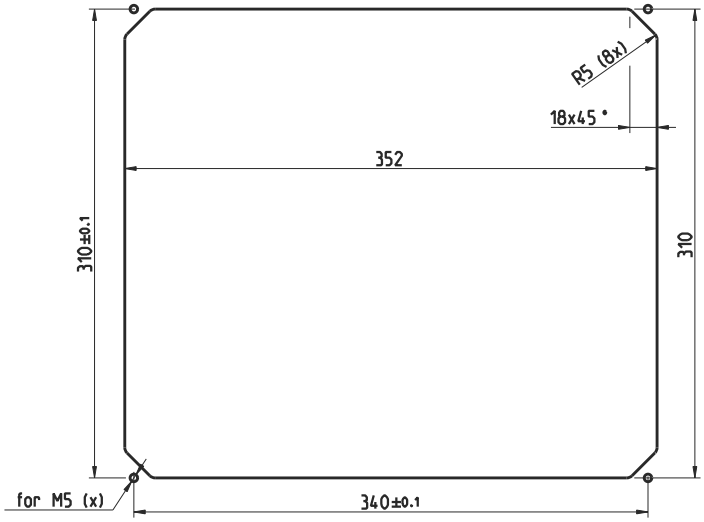
The Hotplate 150-250 BM uses only DIN-CE certified elements or DIN-CE certified materials.

Overall dimensions

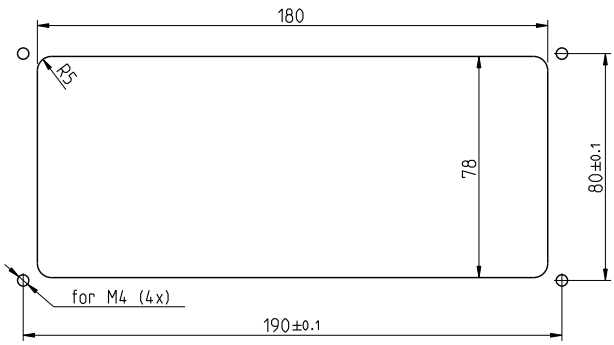


Installation

Plate unit



Control panel



Integration considerations

The system integrator must observe the following rules:

- Malfunction of the exhaust must switch off the device. There is however a protective switch against overheating built in.
- Levelling is essential to avoid intrusion of liquids flowing off the hot plate. This may block the vacuum bores and the exhaust slits.

Safety guidelines

Defined purpose of the product

The Hotplate 150-250 BM is designed and built for the sole purpose of heating flat substrates in the semiconductor industry.

Operating conditions

The Hotplate 150-250 BM must be operated only under environmental conditions as specified in the technical data for the ambient. The exhaust must always be in operation.

The temperature range may need to be reduced depending on the medium to be dried (e.g. lacquer creating dangerous fumes). This must be observed strictly to avoid dangerous situations, such as the escape of aerosols or gas particles generating explosive gas mixtures.

Proper use

Proper use of the product includes obeying of these operating instructions, using qualified personnel.

Improper use

The Hotplate 150-250 BM is not intended to be used for:

- Applying any additional heating devices (e.g. to get higher temperature than specified in the technical data).
- Heating liquids other than lacquers with relatively high viscosity. Low viscosity liquids may run off the substrate and/or create dangerous fumes.
- Heating other objects than thin substrates. The Hotplate 150-250 BM is not a general purpose heating device.

The above list is not exhaustive.

Nameplate

The nameplate on the rear of the device summarizes the technical data and states CE conformity).

Protection against overheating

There is a Clixon® switch in the housing of the hotplate which switches off mains in case of overheating.

The Hotplate 150-250 BM will not function until this thermal relay has cooled down and closed the circuit again.

SAWATEC

INSTRUMENTS

Hotplate HP-150

The SAWATEC HP-150 hotplate has been developed for standard soft bake and hard bake processes in lithography and similar applications. The temperature range is designed as standard up to 250° C. The HP-150 offers high uniformity and process repeatability and can be used for substrates up to 150mm.

Outstanding features of the hotplate are its robust design and ease of operation. The hotplate's modular design means that it can be used in a wide range of applications with optional expandability (wet bench integration).

FEATURES:

- Digital temperature controller with actual- and nominal value
- Max. substrate size 150mm
- Substrate loading: manual
- Substrat fixation via vacuum manual controlled
- Accuracy of temperature: +/-1°C per 100°C

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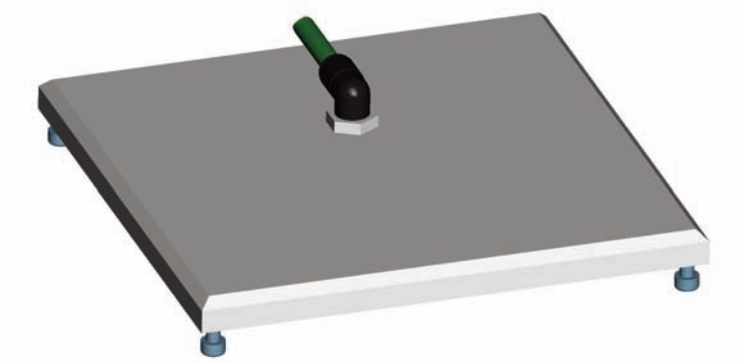
Pictures may show standards with options.

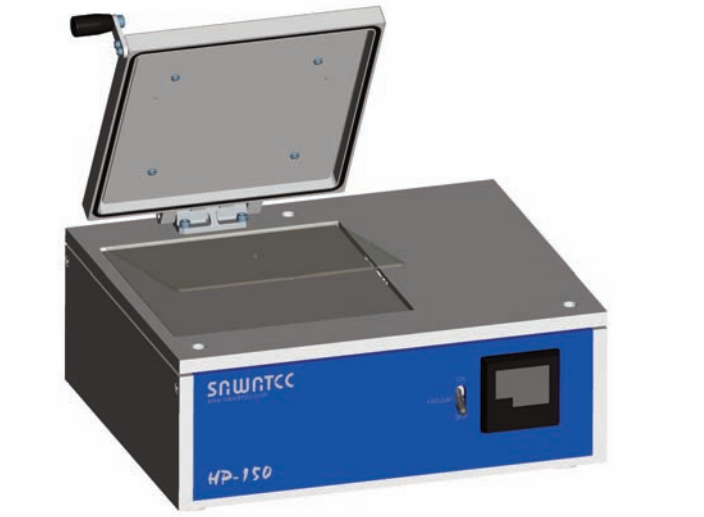
OPTIONS

- ⇨ Lid manual handling made by anodised aluminium incl. hinge and mounting parts
  - Internal height max. 6mm
  - Max. substrat thickness 5mm
- ⇨ Nitrogen flush manual controlled
  - N2-lid made or anodised aluminium
  - Manual switch for N-2-control
- ⇨ Protection glass without pins

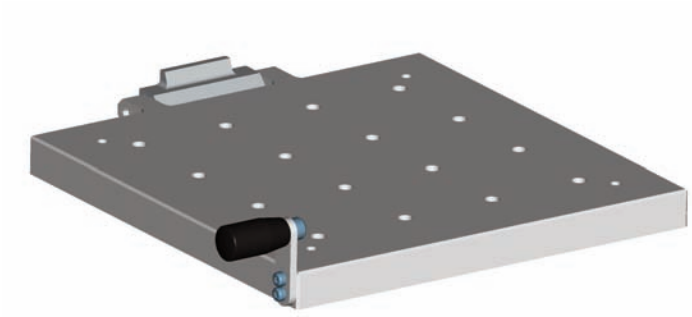
N2-LID



PROTECTION GLASS



MANUAL LID



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Pictures may show standards with options.

PERFORMANCE

- ⇨ Temperature range: 25 - 250°C
- ⇨ Accuracy of temperature: +/-1°C bei 100°C
- ⇨ Substrate loading: manual
- ⇨ Substrat fixation via vacuum manual controlled
- ⇨ Max. substrate size 150mm

REQUIRED MEDIA

- ⇨ 240 VAC 50/60Hz (350 W)
- ⇨ Technical vacuum, tube Ø 6/4mm
- ⇨ Internal ventilator

For further information please contact our sales-department: sales@sawatec.com

Pictures may show standards with options.

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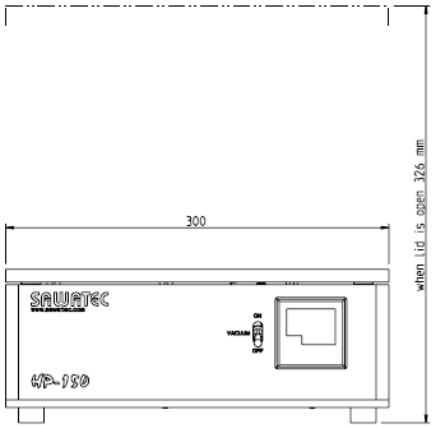
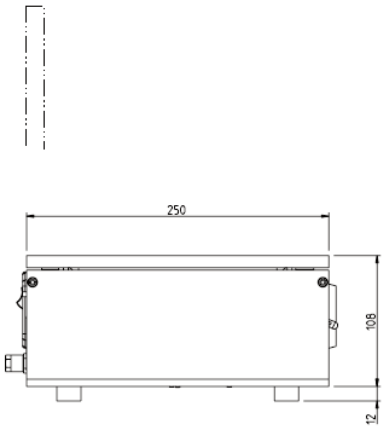
HP-150

VIEWS

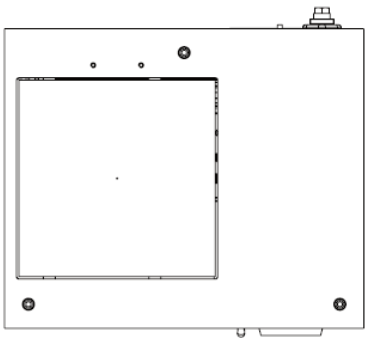
front view



side view



top view



DIMENSIONS

⇨	Size:	300x250x120mm (LxBxH)
⇨	Hotplate size:	164X164mm
⇨	Weight:	approx. 7kg

DESIGN

⇨	Housing:	Anodised aluminium
⇨	Hotplate material:	Anodised aluminium

DEALER

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Pictures may show standards with options.

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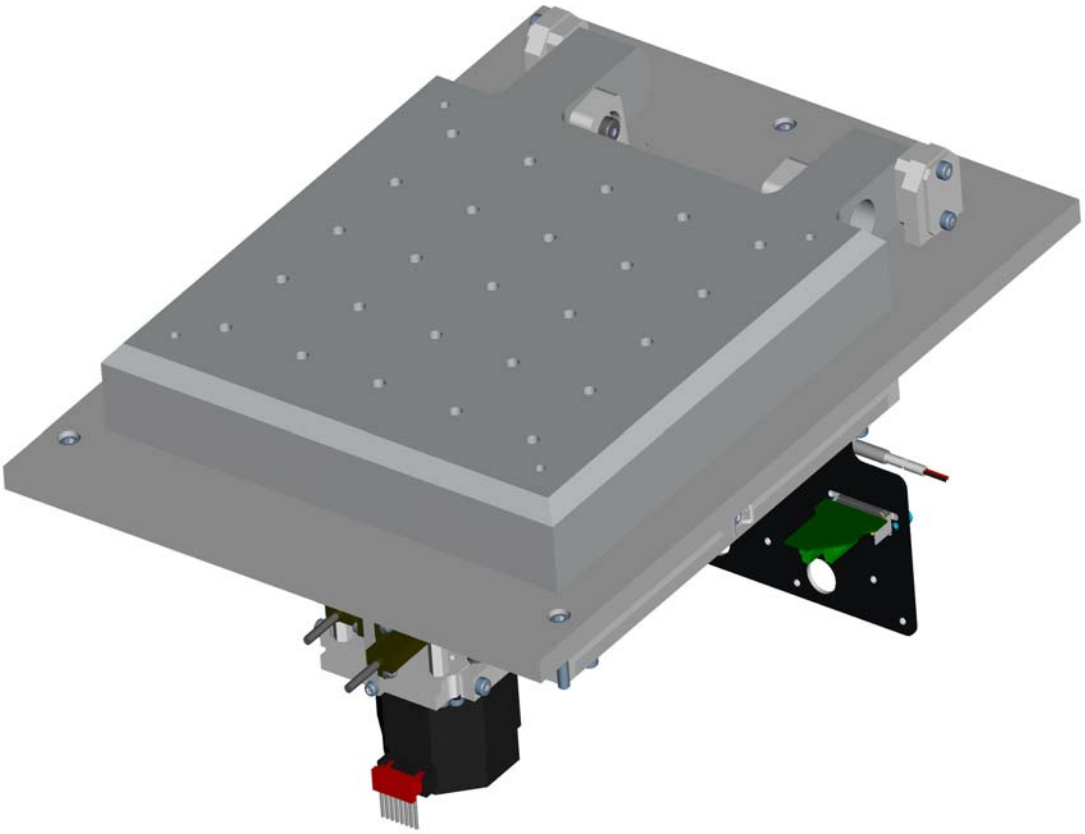
User Manual

Hotplate HP-200-BM



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Title	Hotplate HP-200-BM – User Manuall *This manual describes an integrated version, not a bench-mounted stand-alone version.*
Manual	MA-HP-200-BM en
Revision	November 2013
History	v2.0:Larger plate, small touch panel, generalised software v1.0: First issue of manual (2010-06)
Date of print	2013-11-12
Products	Hotplate HP-200-BM

Audience	This description of the Hotplate HP-200-BM is intended for end-users.

Manufacturer	SAWATEC AG Eschagger 2 CH-9468 Sax Phone: +41-81-750 44 00 Fax: +41-81-750 44 01 E-mail: info@sawatec.com Web: www.sawatec.com

Customer service information	Write down the contact details (phone, fax, etc.) for your System integrator or local distributor

Set up password (see page 29)	Factory setting is twice the installation number (ANO on the name plate), for example 706706.
Customer set password	.....

Ancillary documentation

The following documents are part of the delivery, but not of this document:

- Electric and pneumatic schemes
- Maintenance plan
- List of spare parts and wear parts

Content

Product description

The Hotplate HP-200-BM is designed for *constant temperature* processes in the semiconductor industry. This includes priming and baking of silicon wafers, and glass masks.

Note: *This manual describes an integrated version, not a bench-mounted stand-alone version. Hence no information is given concerning installation dimensions, piping etc.*

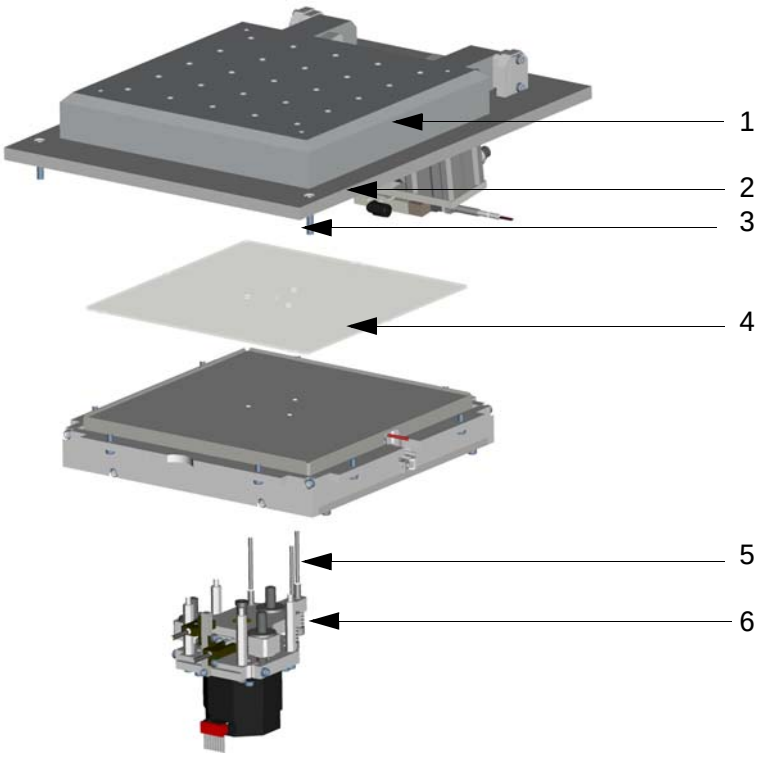
Main features

- Wide temperature range 25 °C to 250 °C for substrate sizes up to 8"× 8" (200×200mm).
- Loading/proximity pins can be adjusted in increments of 0.1 mm
- With closed cover the hotplate creates a sealed chamber.
- Bake out under air or nitrogen (option)
- Dehydration and flush with nitrogen (option)
- Controller can store 50 process programs with 24 segments each.

Main parts

The exploded view below shows the main parts of the Hotplate HP-200-BM (control equipment is not depicted):

- Base plate [**2**] to be mounted in a housing.
- Lid (hood) [**1**] is lifted pneumatically.
- Loading/proximity pins [**5**] are moved by the mechanism [**6**].
- Levelling screws [**3**] balance the main plate within the frame plate which is integrated to the housing.
- The protective glass [**4**] supports keeping clean the Hotplate.



Technical data

Operational characteristics

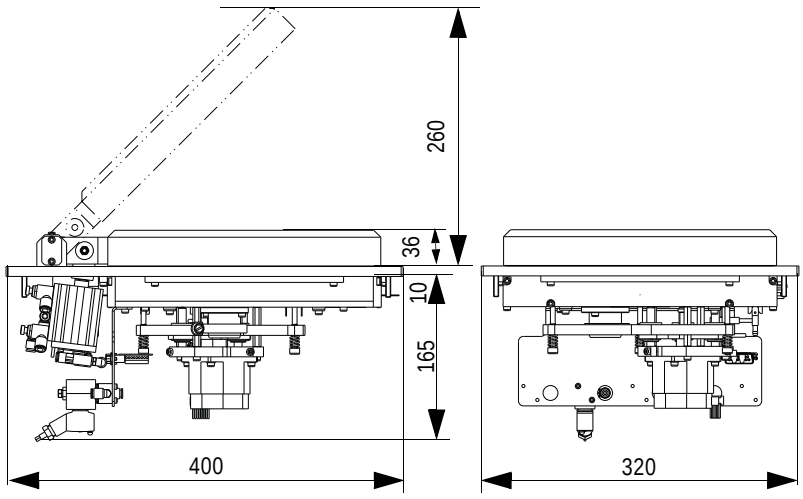
Property	Nominal value	Tolerance / specification
Hotplate dimensions	250 x 250 mm	Material: Aluminium alloy
Substrate size max.	8” (200mm) diameter 8” (200mm) square	
Temperature range	25 °C to 250 °C	0.1 °C display resolution
Temperature uniformity	± 0.5 °C	at 100 °C
Process control	up to 50 programs with 24 segments	
Substrate lifting	0 to 15 mm	process controlled
Proximity adjustment	0.1 ... 1 mm	

Physical properties and environment

Property	Nominal value	Specification
Width / depth / height	32 / 40 / 18 cm	See details in diagram below
Weight	25 kg	Including ancillary components
Electrical power	230VAC, LNPE 50/60Hz, 10 A fuse	Cable without plug
Compressed air for pneumatic functions	4 bar clean dry air (CDA)	Fitting Ø 6/4 mm
Exhaust	3-10 m^3/h	Fitting Ø 32 mm for heat resistant hose
Vacuum to hold the substrate in place	Technical vacuum 0.5 bar	Fitting Ø 6/4 mm
Ambient	21 °C, humidity < 45%	

The Hotplate HP-200-BM must be set up on a clean, plain, levelled surface in proper distance to any flammable material.

Dimensions



Standards

The Hotplate HP-200-BM uses only DIN-CE certified elements or DIN-CE certified materials.

Integration

A sample integration is the SAWATEC HP-200 depicted to the left.

A stand alone version of the Hotplate HP-200-BM comprises the following ancillary components:

- Hotplate with frame plate.
- Controller with touch screen.
- Electric panel (main switch, start/stop buttons, solid state relays.
- Pneumatic panel (solenoid valves, pressure control, pressure and vacuum gauges, manual flap to control exhaust suction rate).

When integrating into a table the installation dimensions and the additional documentation must be observed:

- Electric diagram
- Pneumatic diagram

Not installed options

Installed options are activated in the control program (see *Machine parameters* on page 22).

Not installed options render the corresponding buttons and entry fields light grey. These elements are inactive.

Depending on installed options some buttons may change their caption (e.g. Cooling On/Off ➔ Heating On/Off)

Connectors

1 Vacuum entry connection (holding protective glass and substrate).

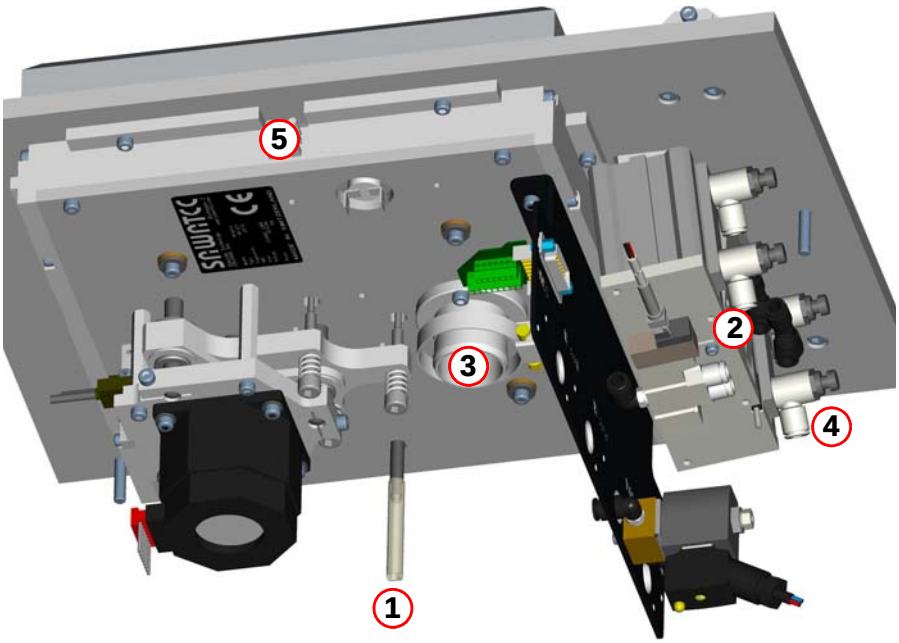
2 Compressed air to move the lid (hood). Pressure controlled, 4bar.

3 Exhaust. A heat resistant hose is fixed by a clamp.

4 Check valves to adjust the speed of the lid movement.

5 Connection of electric cables from controller via solid state relays.

Connectors are located at the bottom side:



Depending on installed options more connections may be available (e.g. for HMDS flushing).

Safety guidelines

Definition of users

Operator

The operator of the Hotplate HP-200-BM is the person who performs all tasks related to the intended use of the product. In particular this is handling and cleaning.

Note: *The Hotplate must be operated only by educated instructed personnel.*

Defined purpose and known misuses

Defined purpose of the product

The Hotplate HP-200-BM is designed and built for the sole purpose of heating flat substrates in the semiconductor industry.

Operating conditions

The Hotplate HP-200-BM must be operated only under environmental conditions as specified in the technical data for the ambient. The exhaust must always be in operation.

The temperature range may need to be reduced depending on the medium to be dried (e.g. lacquer creating dangerous fumes).

Proper use

Proper use of the product includes obeying of these operating instructions by qualified personnel.

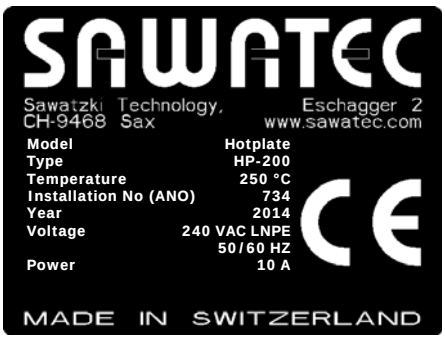
Improper use

The Hotplate HP-200-BM is not intended to be used for (list is not exhaustive):

- Applying any additional heating devices (e.g. to get higher temperature than specified in the technical data).
- Heating liquids with low viscosity. These may run off the substrate, produce dangerous fumes or block the vacuum system.
- Heating of materials with a melting point < 300 °C.
- Heating other objects than thin substrates. The Hotplate HP-200-BM is not a general purpose heating device.
- Drying or heating of flammable material or material which may inflame itself at the process temperature.

Nameplate

The nameplate is located at the rear of the housing (when integrated) and states CE conformity.



Basic danger

A heating device becomes hot by definition. Burning of live tissue may result if the plate and heated objects are touched without appropriate aids.

Residual dangers

Warning	**Overheating by missing exhaust**
	Proper functioning exhaust is essential for control of the temperature in the device. The device must be operated only with a functioning exhaust. If the exhaust is malfunctioning the device must be switched off.
Caution	**High temperature**
	Depending on the settings on the control panel the temperature of the heating plate may be very harmful to live tissue. Do not touch the heating plate after operation of the Hotplate HP-200-BM! Always use appropriate instruments to remove the processed substrates from the device.
	Sudden lifting of cover
	When switching the device on with the mains switch, the cover may be lifted suddenly. Before switching on, always reduce the pressure of the compressed air to a minimum and then regulate it up to the working pressure (4.0 bar).
	Strong hinges
	The hinges of the cover can create a strong force which can crush fingers. Keep off from the area of the hinges when the cover is open and is about to close!

Protection against overheating

A Klixon® switch in the housing of the device switches off mains in case of overheating. This results in an alarm message, which must be acknowledged to be able to start a program/recipe again.

The Hotplate HP-200-BM will not function until this thermal relay has cooled down and closed the circuit again.

Setting up the device

Even if the device is implemented into a housing with levelling screws to balance uneven floor, the heating plate must be levelled within its frame plate.

Level the plate

The heating plate must be levelled to avoid unequal thicknesses of coating during the heating process.

1 Lift the lid manually and fix it in open position.

2 Place a small level tool on the plate.

3 Use an Allan key size 4 mm to adjust the three levelling screws (M5). Do not turn the screws more than ± 1.5 turns.

Controlling the process

Controller interface

Content of screenshots on this page is explanatory only!

The user interface of the controller comprises a touch panel which both displays information and allows for user input.

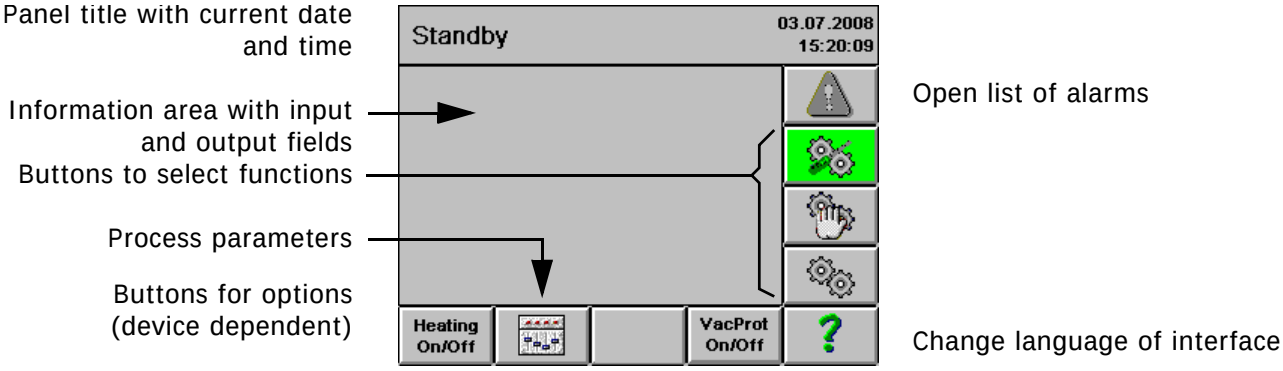
Using the touch panel

Do not press on the touch panel, just touch the surface gently with your finger or a soft pointing device.

Note: *It is necessary to touch the panel for at least 1 second in order to let the program recognise your action.*

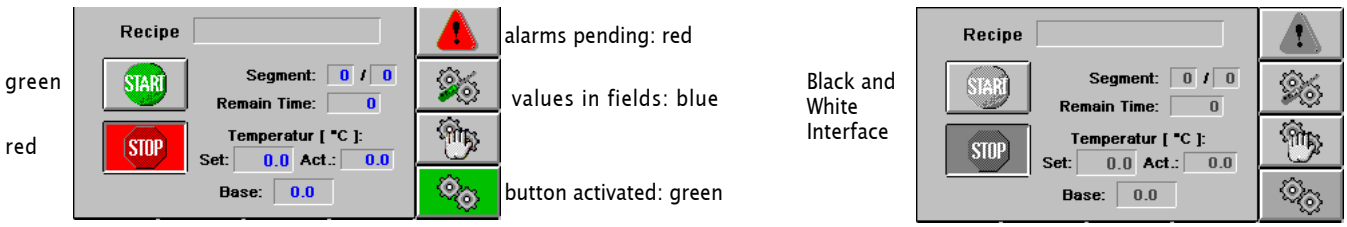
Display area

The area of the display is divided into four sections:



Colour and b/w panel

Depending on the order the control panel provides a colour screen or a black-and-white (b/w) screen. This document referes to the colour screen. The mentioned colours (red, green) appear as darker gray on the b/w screen. You may need to adjust brightness/contrast for best view (System parameters).



Active and inactive buttons

The user interface may contain inactive buttons for options or functions which are not implemented in the particular device. Such buttons look transparent:

User types

Passwords define three levels of users:

User Can run processes both manually and automatically.

Setup Can define processes (recipes) and perform all **User** actions.

Master Can set passwords, machine parameters and perform all **Setup** actions. Of course, all **User** actions can also be performed.

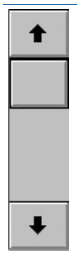
Popup boxes

Depending on selected functions pop-up boxes are displayed which are smaller than the entire screen.

These popup boxes disappear after 5 seconds, if no input is provided or no button touched.

General buttons and controls

The following buttons and controls are used in various dialogues

Button	Function
	Exit any display with this button. In a menu hierarchy you walk one step up (back).
	Alarm is active. Touch the button to open the Alarm display.
	Cancel: Leave the current dialogue without setting any values
	OK: Accept the provided (changed) input values of the current dialogue.
	Acknowledge: Confirm a message with this button.
	Help: Display help about the controller menus. This function is currently supported only rudimentary.
	Increment (upper button) or decrement (lower button) the value displayed between the two buttons. The increment normally is 1, but not necessarily.
	Scroll bars to the right of lists. Touch the lower button to scroll forward in the list Touch the upper button to scroll backward in the list. For a quick location you may drag the slider button (touch and move the button).

Numeric data entry

To change the value in a field (such as a temperature or speed):

- Touch the field on the display.
- In the appearing pop-up enter the desired value and leave the pop-up with the **Exit** button  .

The maximum and minimum value which may be entered is displayed on top. The middle line displays the current entry.
Remove the last entered figure

Reset value to 0, clear the entry

Accept the input value. The panel is not left.

Alphanumeric data entry

To change the text in a field (such as the name of a process):

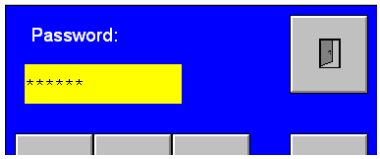
- Touch the field on the display.
- In the appearing pop-up enter the desired text and leave the pop-up with the **Exit** button  .

Entered text

Accept the input value with **Enter**.
(this leaves the pop-up)
Remove the last entered character with ←.

Password entry

When touching a password entry field, a pop up similar to the numeric data entry appears. The entered data is displayed as asterisks. The password can not be longer than 8 figures.



Confirm the data entry with the button **OK**  , then leave the panel with button **Exit**  .

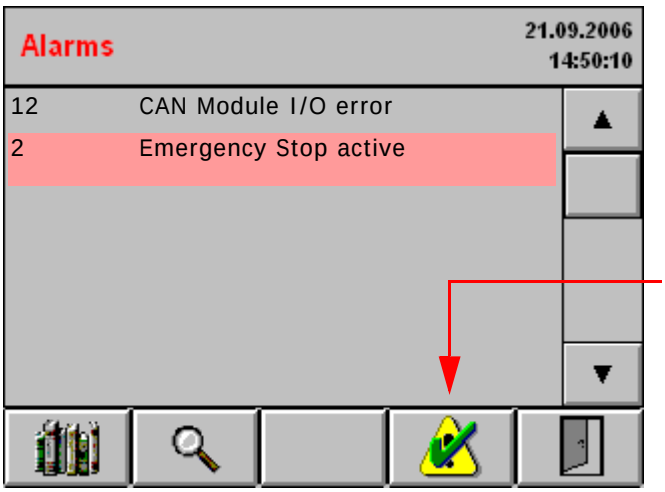
Status Messages

During a process the central area of the display shows status messages. These do not require any user action.

Alarm handling

If user intervention becomes necessary, the alarm button  flashes . The alarm message is displayed after touching the alarm button.

Alarm texts depend on the device. This is only an example display.

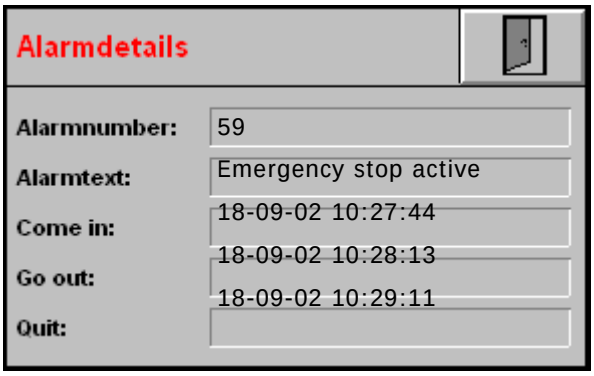


Press button to clear details about 2 seconds.

To get the details of the alarm, select it and touch button  . A pop-up window appears:

Note: *Each alarm must be acknowledged, before the machine can continue*

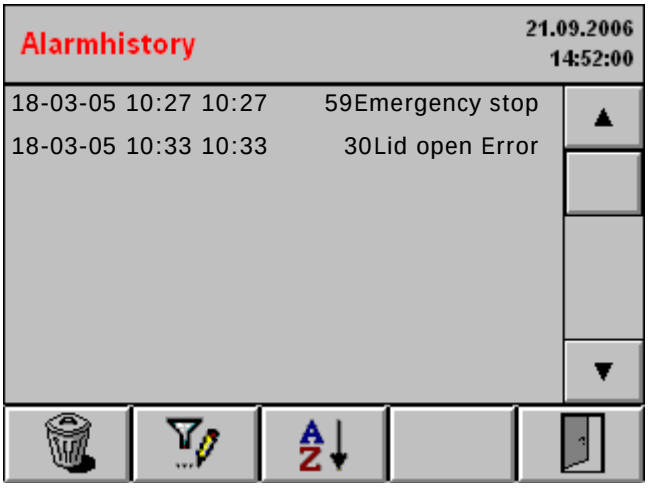
Alarm texts depend on the device. This is only an example display.



Alarm history

The alarm history contains all confirmed and not confirmed alarms. It is entered from the Alarm display with the history button 

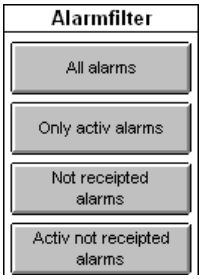
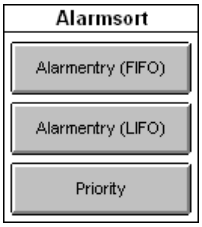
Alarm texts depend on the device. This is only an example display.



Possible actions

Function	Button
Delete the complete history **Attention**: You are not prompted to confirm the action	
Filter display of messages: a popup window will appear	
Sort messages: a popup window will appear	

Filter alarm display

Filter - popup	Sort - popup
	
To select the desired filter, touch the appropriate button.	To sort according to your desire touch the appropriate button.

Switching on and off

Switching on

1 Assure proper function of electricity, compressed air, N_2, vacuum and exhaust.

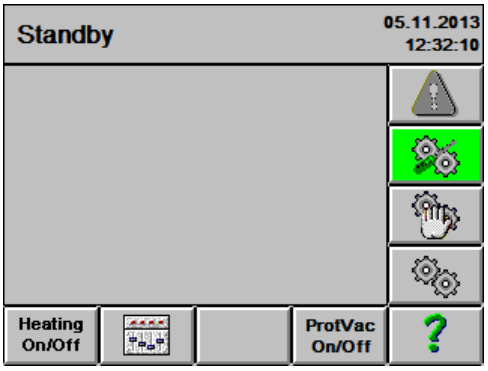
2 Check for vacuum to hold the substrates.

3 Adjust the pressure of compressed air to the minimum.

☞ If compressed air is switched ON without any pressure control, then the cover will be lifted suddenly with great force. This is dangerous for the operator.

4 Switch on the device with the main switch on ➔ the control initialises.

5 After about 10 sec the **Stand by** panel displays:



Current date and time

Stand by

Manual mode

Automatic mode

How to come here

This panel can be reached from any process/recipe panel with the **Exit** button  .

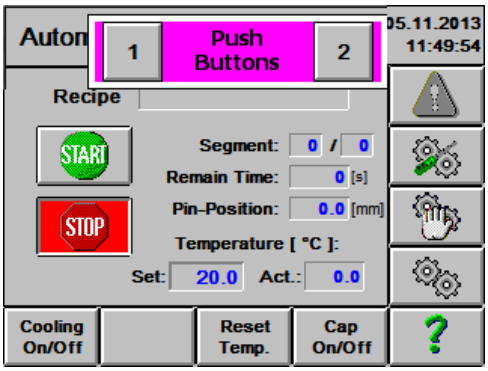
Possible actions

For buttons not explained here see *General buttons and controls* on page 11.

Function	Button
Display alarm (alarm button is red) See *Alarm handling* on page 12	
Switch to manual mode See *Manual mode* on page 19	
Switch to automatic mode See *Automatic mode* on page 17	
Set process parameters and system parameters See *Setting parameters* on page 21	
Switch heating individually	**Heating On / Off**
Switch vacuum to hold the protective glass in place	**ProtVac On / Off**

Screen blocker

To avoid unintentionally entry on the touch screen, a special panel protects the automatic mode. :



Screen blocker

To get access to the blocked panel, touch button **1** and then button **2**.

The time delay for blocking the touch panel is set in the *Machine parameters* on page 22, value `Screen Saver Off Time`.

Switching off

End of process

Normally a program provides these functions:

- Vacuum is switched off
- Cover (lid) is lifted
- Signal sounds (3 sec)

Termination

1 Leave all menus by pressing the **Exit** button  repeatedly until the **Stand by** panel appears.

2 Switch off the unit with the main switch. Location and appearance of the main switch depend on the integration.

Adjust proximity pins

Proximity pins define the distance between substrate and the heated plate. This distance is defined tin the Process/Recipe parameters (see *Process/recipe parameters* on page 25).

If the working method is switched between using a protecting glass and not using it, then the proximity pins must be adjusted.

Electric pins

- Set the value `Prot. Plate Thickness` in the *Machine parameters* on page 22.
- The upper most position of the pins is defined by Home. The corresponding value in the machine parameters is `Pin Startposition`.

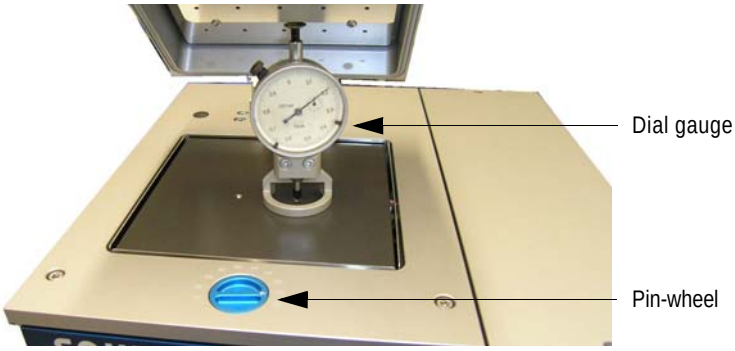
During a process the proximity pins are moved between these endpoints.

Pneumatic pins

Note: *Adjust the proximity value only in lower position of the pins!*

1 Set the pin-wheel to a value of 0.5 mm.

2 Check the height of the loading pins with a dial gauge.



3 If the measurement of the pins differs from the setting of the pin-wheel you need to adjust the pins with a 5 mm Allen key:

For access to the adjustment screws in bench top versions (BT) there are three holes in the bottom plate.

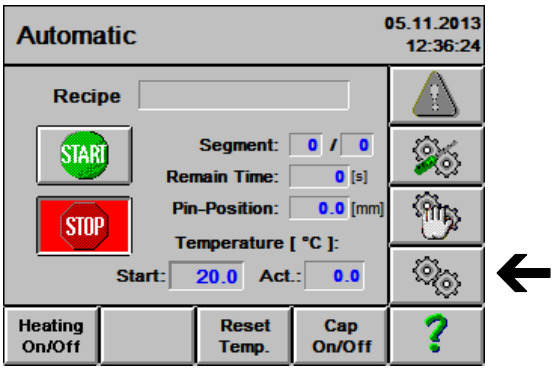
Processing

Automatic mode

Panel **Automatic** is the standard display during normal operation. In this mode the process/recipe is started either by a handling device or the integrated Start/Stop buttons.

How to come here

From any **Stand by** panel with the **Automatic** button  .



Display while running a process/recipe

The parameters of the process/recipe are continually displayed. For example the Segment number loops through the recipe steps.

Set temperature

This can be set by *Process/recipe parameters* on page 25. This temperature is kept outside a recipe/program, that is, in Stand-By mode. See button “Reset Temp.” below.

Possible actions

For buttons not explained here see *General buttons and controls* on page 11

Function	Button
Select a process/recipe to be run (See *Select process/recipe* on page 18)	Touch the field **Recipe**
Set the start / base temperature	Touch the field **Set** (Temperature)
Start the selected process/recipe	
Stop current process	

Functions in stopped mode

The following settings overrun those from a current process/recipe:

Function	Button
Switch heating	**Heating On / Off**
Reset the temperature to the Start temperature. This is necessary to start a process with lower temperature after a process with higher temperature.	**Reset Temp.**
Keep the lid (cap) open (On) or closed (Off)	**Cap On / Off**

Select process/recipe

How to come here

From the **Automatic** panel, touching the field **Recipe**.

- Use the up and/or down arrows to select the desired process/recipe in the list.
- Accept the selection with the **OK** button
- Withdraw the selection with the **Cancel** button

Manual mode

With panel **Manual** the user can control every sub device manually).

Note: *Both in Automatic mode and in Manual mode functions damaging the device are not possible.*

How to come here

From the **Stand by** panel or **Automatic** panel with the **Manual** button  .

Possible actions

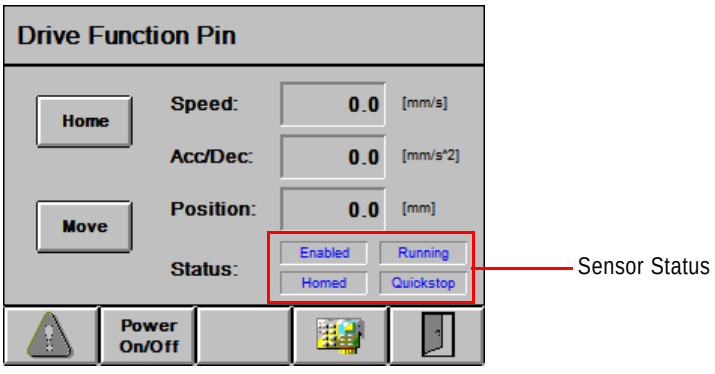
You can set up the General Functions as well as switch the heating individually.

Function	Button
Switch the heating on or off	Heating On/Off
Perform pin functions (see hereafter)	
General functions (see *General functions* on page 20)	

Pin functions

How to come here

In **Automatic** panel touch button  .



Power On must be used first to be able to move the pins.

Home moves the pins to their top most position.

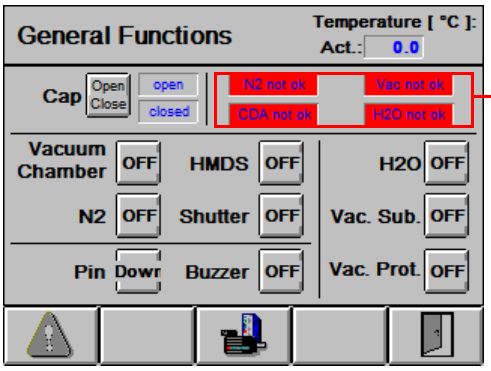
Move moves the pins to the position defined in the field **Position** (above protective glass / plate)

Power must be switched off before leaving the panel.

General functions

How to come here

In the **Manual** panel with the **General** button  .



The button captions show the current state. The button changes to green if touched and the caption changes also.

Output display

Status of the sensors for cap (lid) and media.

Possible actions

Buttons (except the Buzzer) are switches. Their On state is indicated by a green button. The Buzzer is only on as long at it is pressed.

Note:

Buttons for not-installed functions look transparent and are inactive.

Function	Button at label
Open/close the lid (cap)	**Cap**
Vacuum for the process chamber	**Vacuum Chamber**
Switch HMDS application	**HMDS**
Switch cooling water	**H2O**
Switch the N_2 flushing	**N2**
Switch the programmable exhaust shutter	**Shutter**
Switch the vacuum to hold the substrates	**Vac. Sub**
Move Pins Down ➔ Up	**Pin**
Switch the buzzer (sounds as long as button pressed)	**Buzzer**
Switch vacuum to hold the protective glass	**Vac. Prot.**
Perform pin functions (see *Pin functions* on page 19)	

Leave panel

Touch the **Exit** button  to go back to Manual mode.

Alarms

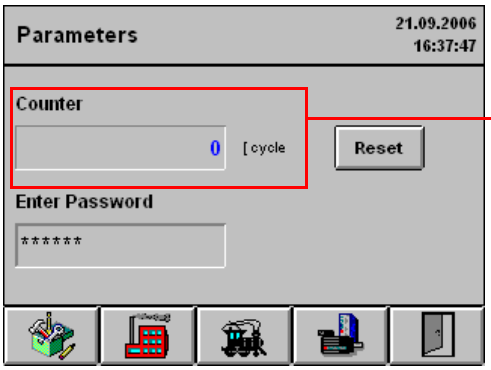
If one of the actions creates an alarm, then the Alarm button becomes red:  . Alarms must be acknowledged before a process can be continued.

Touch this button to see the Alarm list (see *Alarm handling* on page 12).

Setting parameters

How to come here

In the **Stand by** panel touch the **Setting** button  .



Number of cycles run so far with the currently active recipe.

Enter password

Touch the password field. An alphanumeric key pad appears to enter the desired password. You confirm with the **ENTER** button (see *Set passwords* on page 29).

Note: *A valid password lasts for 15 minutes. After this time it must be re-entered to access the parameter functions again.*
To block access immediately against unauthorised use, enter an invalid password.

Wrong password

If the password is wrong, then all option buttons become inactive.

Possible actions

Function	Button
Reset counter of current process	**Reset**
Set system parameters (see *System settings* on page 28). Can not be set with the User password (button inactive)	
Set machine parameters (see *Machine parameters* on page 22)	
Set process/recipe parameters (see *Process/recipe parameters* on page 25)	
Drive parameters for the pins (see *Heating Autotuning* on page 22)	

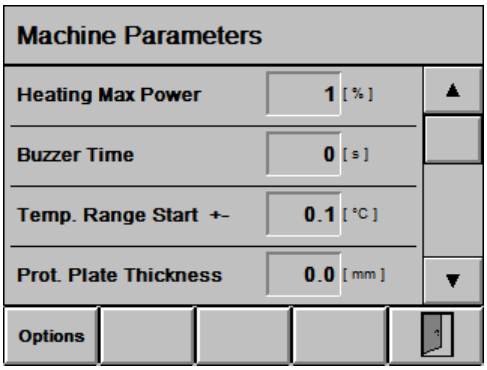
Leave panel

Touch the **Exit** button  to go back to Standby mode.

Machine parameters

Note: *These parameters can only be set with the* **Setup password**.

How to come here: In the **Parameter** panel touch the **Machine** button  .



Possible settings: Availability of settings depend on installed option. These are defined in the panel which You get with the **Options** button  .

General parameters

Value	mini-mum	maxi-mum	typical
Buzzer time [s]	0	30	2
Prot. Plate Thickness [mm]	0.0	99.9	5
Screen Saver Off Time [s] Delay of Input-Blocking (0: no blocking)	0	300	10

Special parameters

Some options are connected to specific machine parameters.

Shutter Activate program controlled shutter
Programmable shutter on page 35

HMDS Filling the chamber with HMDS.
See *HMDS priming* on page 34.

Klixon Housing Watch the temperature of the inner housing of the heating device
Tis is only relevant for Hot Plates.

Vacuum 1 Product Vacuum to hold the substrates in place

N2 N_2 flushing
See *Nitrogen flushing* on page 34

Vacuum Chamber Vacuum for the process chamber

Vacuum Protection Plate Vacuum to hold the protective glass

Pin Pneumatic Pin movement by pneumatic piston

Pin Electrical Pin movement by stepper motor

Pin Process Speed [mm/s]	0.0	999.9	10
Pin Process Acc/Dec [mm/s^2]	0.0	999.9	1
Pin Start Position [mm]	0.0	99.9	8.0

H2O Cooling water for forced cooling

CDA Sensor Monitoring compressed air
Media monitoring on page 34

N2 Sensor Monitoring N2
Media monitoring on page 34

Vacuum Sensor

Monitoring Vacuum
Media monitoring on page 34

Hot Plate

This button allow to switch to a cool plate.

Heating Max- Power [%]	1	100	100
Max. Heating [°C/min]	0.0	99.9	0.1
Temp. range start ± [°C]	0.1	99.9	15

Temp. range start: The device starts a process only, if the target temperature has been reached within this margin. If the process temperature is set to 100 °C and the margin is set to 15°C, then the process starts when 85 °C (when the plate was cooler before) or at 115 °C (if the plate was hotter before).

Cool-Plate

Device is cool plate (default: hot plate)

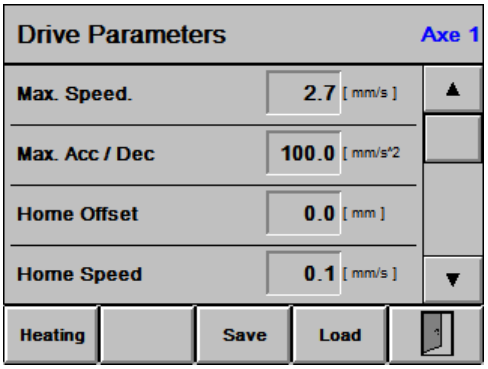
Max Cooling [°C/min]	0.0	99.9	0.1
CP ON-Level (High)	0.1	100.0	20
CP ON-Level (Low)	0.1	100.0	20

The **CP-ON leve**ls define the upper and lower temperatures for the control of a chiller of the cooling water.

Drive parameters

Note: *These parameters can only be set with the* **Master password**.

How to come here: In the **Parameter** panel touch the **drive** button  .



Possible settings

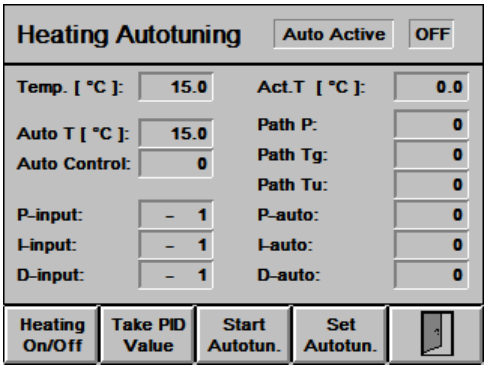
Value	mini-mum	maxi-mum	typical
Max. Speed. [mm/s]	0 s	2.7	2.5
Max. Acc / Dec [mm/s^2]	0.1	100.0	80.0
Home Offset [mm]	0.0	99.9	8
Home Speed. [mm/s]	0.1	999.9	5.0
Home Acc / Dec [mm/s^2]	0.1	999.9	50.0
Motor Direction	POS	NEG	POS
PIN Process Acc. [mm/s^2]	0.0	999.9	5.0
PIN Process Speed. [mm/s]	0.0	999.9	50.0
Current in % of 7.5 A	1	20	2
Max Input Distance (Offset PIN below Plate) [mm]	0.0	99.9	0.00
Max. Temperature [°]	50.0	300.0	150.0
Heating Control P, I, D	0	65535	
Pin Slope [mm/Revol.]	0.1	50.0	1.0
Heating Offset [%]	-50.0	50.0	0.0

Save Saves the current settings to a parameter file

Load Loads settings from a parameter file

Heating button

The Heating Autotuning function defines the characteristic of the heating device:

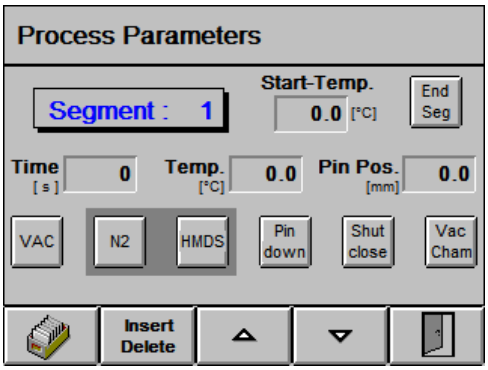


This function is used only by the Service Technician and hence not explained any further.

Process/recipe parameters

How to come here

In **Standby** touch the Settings button  ; in **Parameters** touch the **Process** button  . **Setup** password is required.



Note:

Buttons for not-installed functions look transparent and are inactive.

Output display

Current segment number.

Set up a process/recipe

For each segment of the process/recipe specify the necessary ingredients. No settings are automatically copied from a previous segment.

See a *Program/recipe examples* on page 31.

Grey buttons are in state Off/down/closed. If a button is touched it becomes green to indicate the status On/up/open.

Recipe parameters

End Seg.	Press this button for the last segment in a recipe only. The button will become green.
Start Temp.	This temperature is kept outside of a process. Hence in Stand By the Hotplate will not cool down to ambient temperature, but only to this temperature.
Time	Total time of this segment in seconds.
Temp.	End temperature in this segment. Time and Temperature depend on the machine parameter `Temp. Range`.
Pin Pos.	For electric pins: Pin position (above protective glass or plate).
VAC	Vacuum to hold the substrates in place.
N2	N_2 flushing during this segment.
HMDS	Filling of process chamber with HMDS

Note: *N2 and HMDS are interlocked within a segment.*

Pin down	For pneumatic pins: Move pins down during segment. If button is pressed, move them up.
Shut close	Position of the electro pneumatic shutter. If button is touched it becomes green and displays **Shut open.**
Vac Chamber	Vacuum in the process chamber.

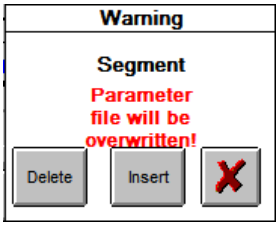
Store segment data

The values of all segments are kept in storage and hence You may freely change between the segments:

Next segment	Touch 
Previous segment	Touch

Insert/Delete button

Use this button to delete or insert a segment:



Delete: The current segment is delete. Segments with a higher number than the current one sill in.

Insert: The current segment is pushed up and the inserted segment becomes the current one.

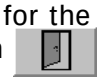
Store current process/ recipe

Touch the **Files** button  . This opens the **Parameter files** panel (see *Save/load parameter files* on page 27). After entering a name and description, touch the **Save** button.

Start work with a sample process/recipe

Touch the **Files** button and select an appropriate process/recipe. With the **Load** button you read the parameters.

Leave panel

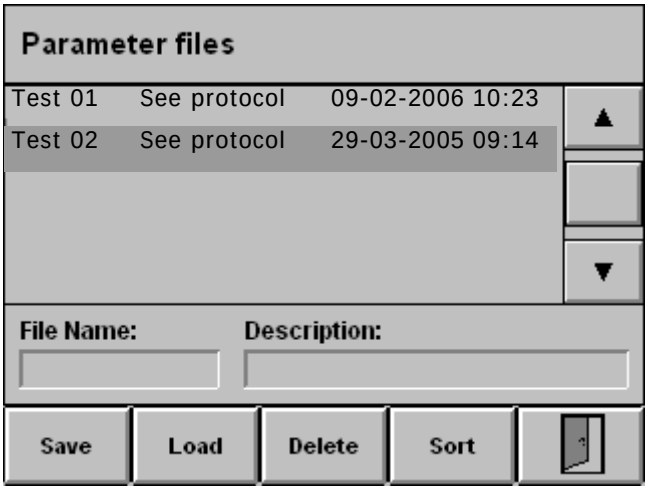
Leaving the panel without saving the process/recipe parameters keeps them only available for the current processing. Leave any panel with the **Exit** button  .

Save/load parameter files

How to come here

In the **Parameters** panel touch the **Files** button  .

These are just examples - and may be irrelevant for the current device



Output display

List of defined (stored) processes/recipes. The active process is highlighted. The columns in the display are in the following order:

- Name (from field File Name)
- Description (from filed Description)
- Date and Time (when saved)

Select a process

Move the selection (highlighted line) with the slider bar or the up and down buttons to the right.

Save new or modified parameters

Enter a name by touching the Name field. At most 8 characters can be given. In the pop up alphanumeric key pad type the name.

Operate similarly for a meaningful description (up to 16 characters) of the process/recipe. Then touch the **Save** button.

Use a sample process

To modify an existing process/recipe or use it as a starting point for a new process, use the **Load** button. You are prompted to allow overwriting the current parameter settings.

Sort the list

After changing the name of an existing process/recipe you may wish to sort the list with the **Sort** button. In a pop-up display you can select the sort criterion in a popup screen: Filename, Description or Time.

Clean out the list

You delete the process/recipe data of the selected process/recipe with the **Delete** button. You will get a confirmation pop-up for this action. You are prompted to allow the deletion.

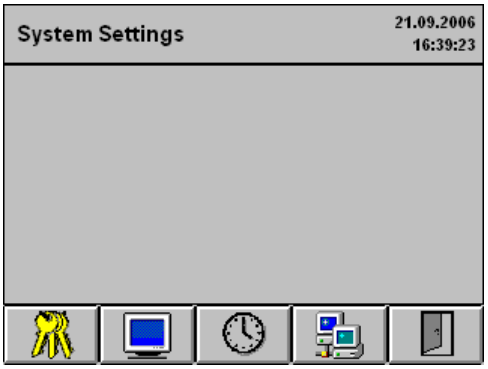
Leave panel

Attention: Leaving the panel with the **Exit** button  without previously saving the parameters keep the parameters in storage only until switching off the machine.

System settings

How to come here

In the Stand by panel touch the **Settings** button  . You are requested to provide the **Setup password**.



Output display

No display, just buttons

Possible actions

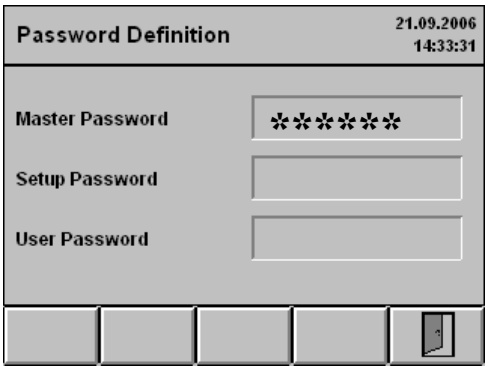
Function	Touch Button	
Set passwords	Keys	
Set display contrast	Screen	
Set date and time	Clock	
Set LAN connection	LAN	

Leave panel

Leave any panel with the **Exit** button  .

Set passwords

Display if logged in with Setup password:



Display fields

Passwords of a higher level as your current one display as asterisks.

Automatic operation does not require entry of a password.

Type of PW	Purpose	Factory settings
Master	Setting machine parameters and passwords.	Not disclosed
Setup	Set up passwords	2x installation number [a)]
User	Setting process/recipe parameters	1

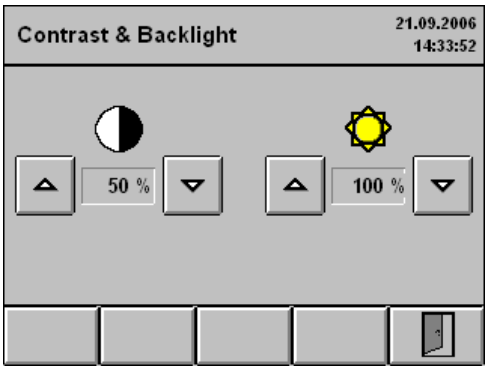
a. The installation number ANO is on the name plate. If ANO is 476 then the Setup password set in the factory is 476476.

Set new values

To change a password,

- Touch the appropriate field (Setup or User)
- The numeric key pad will pop up to enter a new value. See *Numeric data entry* on page 10.
- The new value is displayed.

Set display characteristics



For B/W touch panels only two levels of brightness can be set:

100%	Full brightness
<100%	Lower brightness

Display fields

- Contrast value
- Brightness value

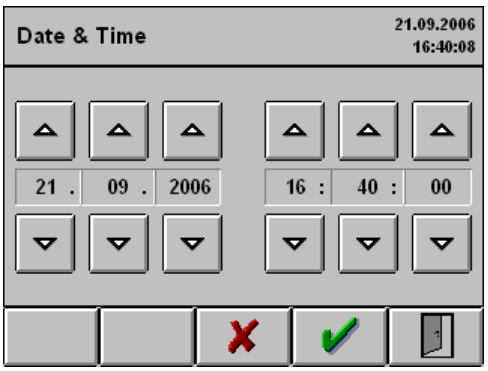
Set new values

To change a value use the **Up** or **Down** arrow buttons.

You may also touch on one of the displayed values (for example, the contrast). The numeric key pad will pop up to enter a new value. See *Numeric data entry* on page 10.

Set date and time

Note: *The operating system in the controller (Windows CE) can not automatically switch between standard time and daylight savings time. Hence the operator must set the time manually after the time switches.*



Display fields
- Day, month, year
- Hour, minute, second

Set new values

To change date or time use the **Up** or **Down** arrow buttons.

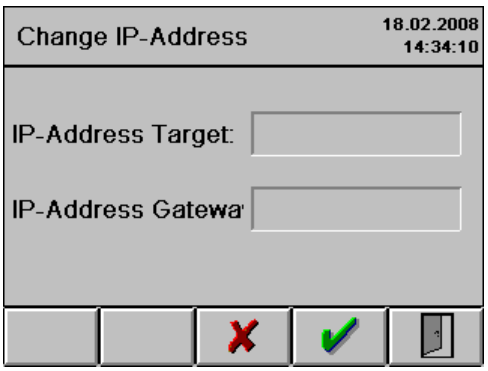
You may also touch on one of the displayed values (for example, the day number). The numeric key pad will pop up to enter a new value. See *Numeric data entry* on page 10.

- To set the new values touch the **OK** button  The new values will be displayed.
- To withdraw the new values touch the **Cancel** button  . The current values will be displayed again.

Set LAN parameters

The communication with the control panel requires a special program licensed from the manufacturer of the panel.

Connection to a Local Area Network is standard.



Factory settings

If values are displayed in these fields, do not change them. Changing the values may cause the controller to fail.

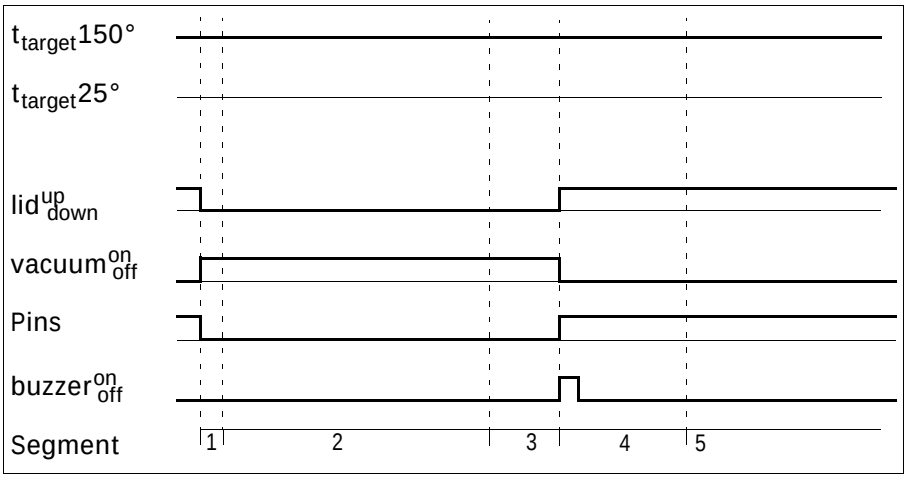
Leave panel

Leave any panel with the **Exit** button  .

Program/recipe examples

Example with constant temperature

This process cycle remains at 150°C.

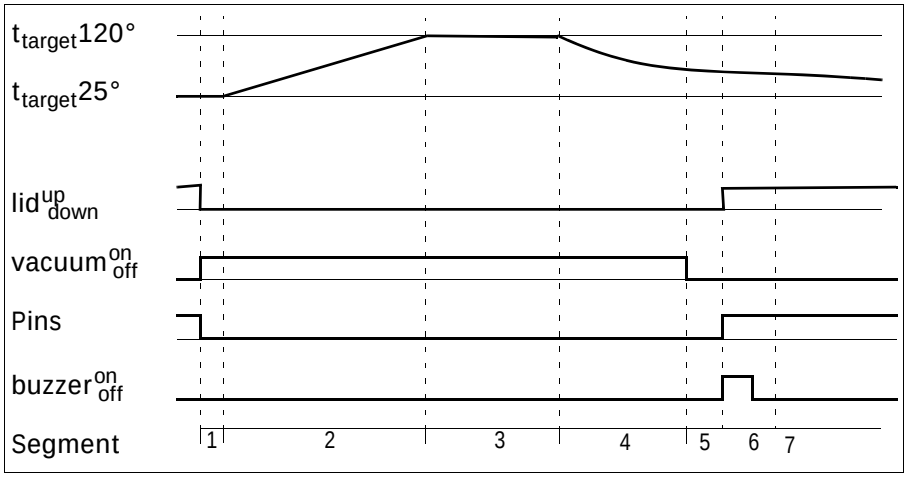


	Start position	Segment				
		1	2	3	4	5
Target temp. °C		150	150	150	150	150
Seg Duration hms		0:00:05	0:15:00	0:00:05	0:01:00	
Vacuum	Off	On	On	On	Off	Off
Pins (and lid/cap)	Up	Up	Down	Down	Up	Up
Buzzer	Off	Off	Off	Off	On	Off
N2 flush (option)	Off	Off	Off	Off	Off	Off

Note: *The natural heating rate is approx. 10°C/min (see Technical data on page 5).*

Example with ramps

This process cycle has a ramp up to 120°C, which is held for 15 minutes. Then it cools down naturally to 25°C (no water cooling assumed in this example).



	start position	Segment 1	2	3	4	5	6	7
Target °C		25	120	120	25	25	25	25
Seg Duration hms		0:00:05	0:20:00	0:15:00	0:20:00	0:00:05	0:01:00	
Vacuum	Off	On	On	On	On	On	Off	Off
Pins and lid/cap	Up	Down	Down	Down	Down	Down	Up	Up
Buzzer	Off	Off	Off	Off	Off	Off	On	Off
N2 flush	Off	Off	Off	Off	Off	Off	Off	Off

Maintenance and repair

The Hotplate HP-200-BM does not need specific maintenance. however, it is recommended that:

- The device is cleaned in intervals determined by the use.
- The sealing in the cover is exchanged if it is damaged and the cover does not close properly any more.

Note: *No other maintenance actions must be carried out by the user.*

Cleaning

When cleaning the Hotplate HP-200-BM,

- Do not disassemble the device for any cleaning purpose. This may render the device inoperable.
- Use any standard industrial cleaner for the outer surfaces except the control elements with the keys.
- Clean the control elements (keys, display) only using a cloth with cleaning solvents recommended for screens and keyboards.

Exchange the sealing in the lid

The sealing is available 'on the roll' from the manufacturer in lengths of about 0.8 m (fitting one hotplate).

To exchange the sealing

1 Switch on the Hotplate Hotplate HP-200-BM to raise the lid.

2 Set the temperature as low as possible to avoid heating.

3 In the groove of the sealing find the place where the sealing is connected and lift one end gently from the groove.

Note: *Avoid any damage to the groove (the lid is made of aluminium) by sharp instruments.*

4 Remove the sealing without tearing it too much to get an indication of the desired length for the replacement.

5 You may wish to clean the groove with cleaning solvent and small swabs.

6 Insert the new sealing carefully without tearing the sealing (avoid incorrect length).

7 The ends should touch with a little pressure.

Options

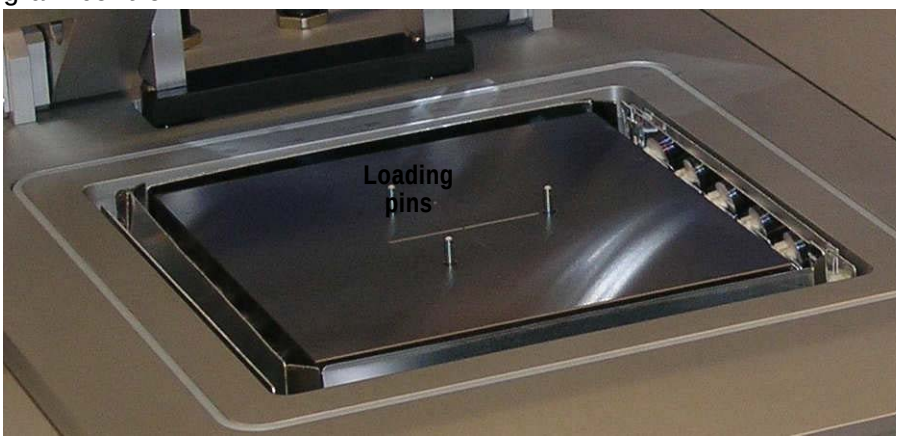
All options are reflected in the controller software and must be switched into operation by the *Machine parameters* on page 22.

Media monitoring

The input media (compressed air, N2, HMDS and vacuum) can be monitored by individual sensors.

Proximity pins

Proximity and loading pins are an option. They are moved by program control.



The 3 loading pins are arranged on a reference circle of 60 mm diameter. Hence they fit for substrates of diameters 75 mm (3") to 150 mm (6"). Smaller substrates can be placed directly on the hotplate or stacked on larger supporting substrates.

Optionally other diameters of the reference circle are possible.

Pin movement

If pins are desired, two options for their movement and control are available:

- Electric pin movement by a stepper motor. This allows to control the proximity in the control program.
- Pneumatic pin movement by a piston. In this case the top position of the pins is set mechanically with a turning wheel behind the plate. Control program can move the pins only between their end-positions.

Nitrogen flushing

This option allows to process in an inert atmosphere avoiding any oxidation.

- The lid gets an additional cover with an N2 inlet
- A solenoid valve for N2 is provided
- In the control program the necessary functions are activated.

Nitrogen flushing and HMDS priming

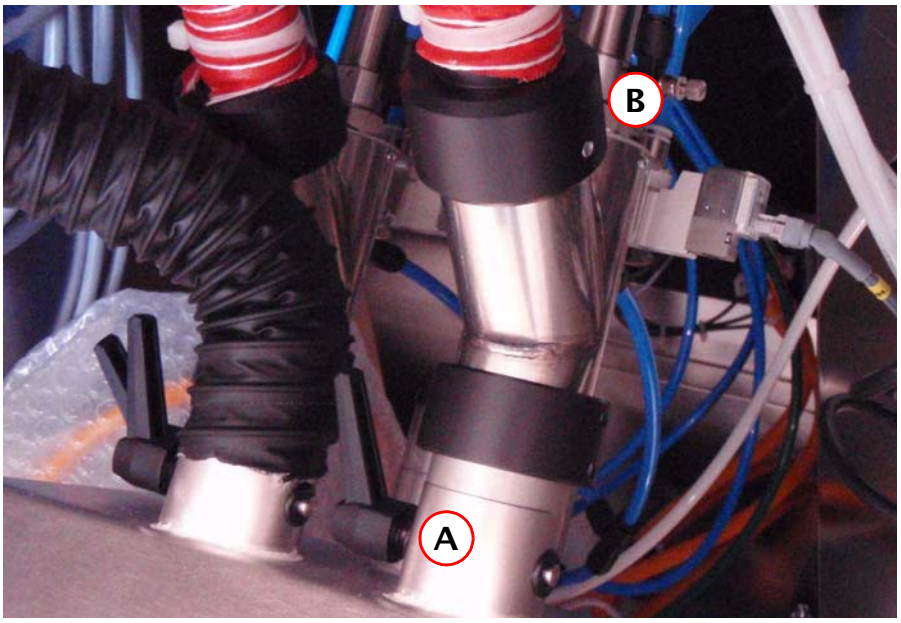
This replaces the option *Nitrogen flushing*:

- The lid for Nitrogen flushing has an additional inlet.
- Both a solenoid valve for N2 and for HMDS is provided.
- In the control program the handling of the HMDS is added to the N2 handling.

Programmable shutter

This option is required for processing with HMDS.

The manually operated shutter **(A)** for the exhaust of a hotplate defines the suction rate. An optional electro pneumatic shutter **(B)** can open and close the flow by program control. This controllable shutter is an addition to the manual shutter:



The shutter can be opened and closed during a process step.